



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/843,545	04/26/2001	Richard D. Harris	01AB021	9246

7590 06/11/2003

John J Horn
Rockwell Technologies, LLC
1201 S Second Street, 8-T29
Milwaukee, WI 53204

EXAMINER

CULBERT, ROBERTS P

ART UNIT PAPER NUMBER

1763

DATE MAILED: 06/11/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/843,545

Applicant(s)

HARRIS ET AL.

Examiner

Roberts Culbert

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 April 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is **non-final**.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-57 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 35-44 and 46-56 is/are allowed.
- 6) ☒ Claim(s) 1-34 and 57 is/are rejected.
- 7) ☒ Claim(s) 1, 15, 45 and 57 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 April 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2-5. 6) ☐ Other: _____

Art Unit: 1763

DETAILED ACTION

Claim Objections

Claims 1, 45, and 57 are objected to because of the following informalities: The phrase "fabricating a MEMS device onto a substrate" is unclear. The correction "fabricating a MEMS device *on* a substrate" is suggested.

Claim 15 is objected to because of the following informalities: The phrase "depositing the first layer is deposited" is unclear. The correction "depositing the first layer" is suggested.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter that the applicant regards as his invention.

Claims 2 -27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 2, it is unclear if the recess is formed into the first layer. It is further unclear where the spacer member is located, which layers constitute the spacer member, or if the spacer member is formed by deposition or removal or both, thereby rendering the scope of the claim unascertainable. See MPEP § 2173.05(d).

Regarding claim 3, it is unclear if the recess is formed by removing a portion of the first surface of the wafer or by etching a portion of the spacer member. It is further unclear what layers constitute the spacer member as indicated above.

Regarding claim 11, it is unclear if the first layer is attached to the first surface of the wafer or the spacer member or both since the spacer member is disposed at a periphery of the recess and the first layer is attached to the first surface of the wafer proximal the recess. It is not clear if proximal the recess and periphery of the recess are intended to be the same location.

Art Unit: 1763

Regarding claim 20, it is unclear if the spacer member is formed by deposition onto the first surface of the wafer or by forming a recess into the first surface of the wafer or both, thereby rendering the scope of the claim unascertainable.

Regarding claim 21, it is unclear if the recess is formed by etching the first surface or the spacer member, thereby rendering the scope of the claim unascertainable.

Regarding claim 22, it is unclear if the how the first layer is deposited onto the wafer proximal the recess since the spacer member covers the first surface of the wafer as recited in claim 20, or the spacer member is formed at the periphery of the recess as recited in claim 1. It is further unclear if the first layer is deposited on the second wafer surface or the first wafer surface or both, thereby rendering the scope of the claim unascertainable.

Regarding claims 24-26, it is unclear if the etching steps recited are intended to be a part of the removing step (d) or if the recited etching steps are additional steps. It is also unclear if claims 24-26 define the same etching step or separate steps.

Regarding claim 28, it is not clear if the recited step occurs before or after the movable MEMS element is separated from the stationary MEMS element.

Regarding claim 29, it is not clear if the steps of producing the movable MEMS element in claim 29, and releasing the movable MEMS element in claim 1 step (d), are intended to occur in the same step. Further it is unclear how a MEMS element with at least two electrically isolated conductive elements is formed since no conductive or insulating elements are recited in claim 1.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Art Unit: 1763

Claim 57 is rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 5,946,549 to Itoigawa.

Referring to figures 9A-9F and the finished device in figure 8, Itoigawa teaches a method for fabricating a MEMS device on a substrate having a movable MEMS element portion free from the substrate and disposed adjacent a stationary MEMS element that is in mechanical communication with the substrate comprising: providing a silicon layer with opposed first and second surfaces (25), depositing a spacer material (24) onto the first surface of the silicon layer (25), forming a recess in the spacer material (figure 9B) attaching the spacer material to the substrate (22) to form a composite structure having a void disposed therein (figure 9C), and removing a portion of the silicon layer to expose the void and release the movable MEMS element. Compare figure 9F and the finished product figure 8.

Although Itoigawa teaches that the wafer (32) constitutes layers (31), (24), and (25), the combination of layers (31) and (25) also constitute a wafer as defined in the prior art, (i.e. an epitaxial layer wafer), therefore the claimed invention does not define over Itoigawa as broadly recited.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Art Unit: 1763

Claim 1, and 28-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,428,713 to Christenson.

Referring to figures 4A-4M, Christenson teaches a method for fabricating a MEMS device on a substrate having a movable MEMS element portion free from the substrate and disposed adjacent a stationary MEMS element that is in mechanical communication with the substrate comprising: providing a wafer (58) having first and second surfaces, providing a silicon substrate (50) with first and second surfaces, forming a recess into the first surface of the substrate (figure 4B) to produce a spacer member disposed at the periphery of the recess, mechanically connecting the spacer member to the wafer to form a composite structure having a void (52) disposed therein (figure 4G), and removing a portion of the wafer to expose the void and to release the movable MEMS element from the stationary MEMS element (figure 4M).

Christenson does not teach forming a recess into the first surface of the wafer to produce the spacer member.

However, one of ordinary skill in the art would have recognized at the time of invention that the spacer member may alternatively be made by forming a recess into either the wafer or the substrate and thus the spacer member may be formed from either the substrate or the wafer material. One of ordinary skill in the art would have been motivated to form the recess into the wafer instead of into the substrate in order to eliminate the step of etching into the substrate material. This design choice would enable all of the etching steps including the release of the movable MEMS element to be performed with the same etching process (i.e. liquid or gas phase, chemistry selection, process conditions).

Regarding claims 28 and 29, Christenson teaches the formation of a stationary MEMS element that has electrically isolated first and second conductive elements (60) See figure 4M. Christenson also shows a movable MEMS element having at least two electrically isolated conductive elements (18). See the top view of the structure shown in figure 1.

Regarding claims 30-34, Christenson teaches that the substrate is made primarily of silicon, or may be made from ceramic, sapphire or stainless steel (Col. 8, Lines 35-43).

Art Unit: 1763

Allowable Subject Matter

Claims 2-27 and 45 are not rejected over the prior art.

As allowable subject matter has been indicated, applicant's reply must either comply with all formal requirements or specifically traverse each requirement not complied with. See 37 CFR 1.111(b) and MPEP § 707.07(a).

Claims 35-44 and 46-56 are allowed.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. McNie teaches a method for making a micro-mechanical sensor using an internal void. Field, Yao, Funk, Laermer, and Muenzel teach methods for forming micro-mechanical structures.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Roberts Culbert whose telephone number is (703) 305-7965. The examiner can normally be reached on Monday-Friday (7:30-4:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (703) 308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

R. Culbert

June 3, 2003


GREGORY MILLS
SUPERVISORY PATENT EXAMINER
TECHNOLOGICAL CENTER